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Hallucinations in critically ill patients: understanding the unreal

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Hallucinations are perceptual experiences that occur in the absence of an external stimulus and can involve any of the five sensory modalities: visual, auditory, olfactory, gustatory, or tactile. Auditory and visual hallucinations are the most common forms encountered clinically. These phenomena may manifest as hearing voices, seeing images, or perceiving sensations that do not correspond with any external reality. Hallucinations are frequently associated with psychiatric disorders such as schizophrenia, neurological disorders such as Parkinson disease, severe sleep deprivation, or substance intoxication and withdrawal. They may also occur in individuals with sensory impairments, such as hearing or vision loss, where the brain may generate internal stimuli in response to the sensory deficit. The content of hallucinations can vary significantly, from benign to distressing or threatening, and may cause substantial psychological distress to the patient. The pathophysiology underlying hallucinations is not fully understood but is believed to involve dysregulation of neurotransmitters, particularly dopamine, and abnormal activity in brain regions responsible for sensory processing. Common risk factors or hallucinations are presented in the Table 1.

The ICU environment likely increases the risk of hallucinations due to multiple factors that disrupt normal cognitive function. Sleep deprivation is common in ICU patients, caused by frequent interruptions, noise, and continuous light exposure, which can precipitate delirium and hallucinations. Sensory overload from persistent alarms, machinery noise, and healthcare staff activity can overwhelm the sensory processing of patients, leading to perceptual distortions. Social and physical isolation in the ICU contributes to psychological stress and anxiety, further predisposing patients to hallucinations. Medications frequently administered in the ICU, including sedatives, analgesics, and anticholinergics, are known to have neuropsychiatric side effects, including hallucinations. Additionally, severe infections and metabolic disturbances, can impair cognitive function and contribute to delirium and associated hallucinations. The disorienting nature of the ICU—characterized by unfamiliar surroundings, lack of natural light, and frequent staff changes—further challenges patients' ability to distinguish between reality and hallucinations [1].

The diagnosis of hallucinations remains challenging in the ICU, as no specific tool has been designed to quantify this symptom at the bedside. Among commonly used scales, the Intensive Care Delirium Screening Checklist (ICDSC) includes a qualitative evaluation of hallucinations [2]. The management of hallucinations focuses on addressing the underlying cause, utilizing non-pharmacological interventions such as reorientation, sleep regulation, and sensory overload reduction. Antipsychotics should be considered only when necessary, particularly for psychiatric conditions.

A recent study multicenter study investigated the prevalence of hallucinations in ICU patients, and their potential association with outcome [3]. Using natural language processing (NLP) to analyze the medical charts of > 7,500 patients admitted to three medical-surgical

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Table 1 Risk factors for hallucinations

Factors	Comment
Age	Elderly individuals, particularly those with dementia, are at higher risk of experiencing hallucinations
Mental health disorders	Schizophrenia, bipolar disorder, and major depressive disorder with psychotic features are strongly associated with hallucinations
Neurologic disorders	Diseases like Parkinson's disease, Alzheimer's disease, epilepsy, and multiple sclerosis can lead to hallucinations
Sensory impairment	Loss of vision or hearing can lead to hallucinations as the brain compensates for the lack of sensory input
Delirium	Delirium can lead to hallucinations, especially in the context of infection, metabolic disturbances, or organ failure(s)
Drugs	Alcohol, cocaine, LSD, and amphetamines, as well as withdrawal from these substances, can cause hallucinations. Other medications, such a ketamine, anticholinergics, and corticosteroids, are also risk factors

ICUs over a 6 year period, the authors found that hallucinations were relatively common, occurring in 8% of cases. Of note, previous single-center studies reported hallucinations in 7–16% of patients during ICU stay [1, 4]. Patients who developed hallucinations were younger, more severely ill, and more likely to have preexisting cirrhosis and/or liver failure. Although the number of patients admitted from mental health facilities was similar between the groups, the number of patients with chronic mental health disorders (i.e. bipolar disorder or schizophrenia) was higher in the group of patients who experienced hallucinations. Hallucinations were mostly visual and less frequently auditory, occurred early, and were strongly associated disturbed behavior on the same day. Interestingly, the authors also identified ICU-related factors associated with hallucinations. Specifically, the use of ketamine and dexmedetomidine were much higher among patients who developed hallucinations. Moreover, such treatments were administered before onset of hallucinations in most cases. Conversely, patients who developed hallucinations were most likely to be treated with antipsychotics (atypical antipsychotics or haloperidol) while in ICU, and such treatments were frequently administered after hallucination onset. Compared to patients without hallucinations, patients with hallucinations had similar ICU and hospital trajectories, and similar mortality rates. Unfortunately, long term outcomes, including cognitive function, and neuropsychological consequences in survivors were not assessed.

These recent findings highlight safety concerns associated with commonly prescribed analgesic and sedative medications in the ICU. Of note, ketamine is increasingly being utilized to manage a variety of conditions in critically ill patients, including pain, status asthmaticus, alcohol withdrawal syndrome, and status epilepticus [5]. Previous single-center studies comparing ketamine-based sedation strategies with non-ketamine alternatives yielded conflicting results regarding the occurrence of delirium or agitation during ICU stay [6, 7]. Although large randomized controlled trials are lacking, systematic review and meta-analysis data suggest that ketamine for sedation in mechanically ventilated patients may be associated with various complications, including neurocognitive effects at the acute phase [8].

Hallucinations can be challenging to identify at the bedside as they may be obscured by other associated symptoms, such as delirium, agitation, or dysautonomia. The use of NLP to analyze clinical progress notes recorded by healthcare professionals represents a promising approach for detecting hallucinations [3]. Whether effective interventions can be developed to prevent or mitigate hallucinations and reduce the burden of neurocognitive dysfunction in ICU patients remains to be determined.

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